REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the above amendments and the following remarks.

Claim 21 has been amended to correct a clerical error. Accordingly, no new matter has been entered.

Claims 21, 22, 29, and 30 were rejected under 35 USC § 102(e) as being anticipated by Maenishi (US 2005/0129997). Claims 21, 22, 26, 27, 29, 30, 34, and 35 were also rejected under 35 USC § 102(b) as being anticipated by Taguchi (US 2003/0175562). Claims 21-23 and 29-31 were also rejected under 35 USC § 102(b) as being anticipated by Ukai (US 2001/0002248). Claims 25, 28, 33, and 36 were also rejected under 35 USC §103(a) as being unpatentable over Ukai as applied to claims 21 and 29, respectively. To the extent that these rejections may be deemed applicable to the amended and new claims presented herein, Applicants respectfully traverse as follows.

Applicants' invention as described in independent claim 21 is directed to a method of operating a hydrogen generator. Another aspect of the invention in this application is set forth in independent claim 29, which is to a method of operating a fuel cell system that includes a hydrogen generator. In both aspects, the hydrogen generator includes a reformer configured to conduct a steam reforming reaction to reform a material to generate a reformed gas containing carbon monoxide, water and hydrogen; a shift converter configured to conduct a shift reaction using the carbon monoxide and steam in the reformed gas; a water supply device configured to supply the water to said reformer; and a material feed device configured to feed the material to said reformer. The claimed methods generally comprise the steps of counting the number of

times in which the hydrogen generator (claim 21) and the fuel cell system (claim 29) are stopped and started-up and increasing the temperature of the reformed gas in the shift converter, increasing the steam to carbon ratio, or both, based on an increase in a number of times in which the hydrogen generator or fuel cell system is stopped and started-up.

Maenishi discloses a hydrogen generator that comprises a controller configured to control supply of a material from a material supply portion and supply of water from a water supply portion. In general, the controller monitors water evaporator temperature and reforming catalyst temperature. Based on this monitored temperature, the controller controls water supply from the water supply portion to the water evaporator.

At page 2 of the Office Action, it has been alleged that Applicants previously argued that Maenishi "does not disclose counting the number of times in which the hydrogen generator is started up and/or stopped and then increasing reformed gas temperature in the shift convertor." Applicant's point out that the argument quoted in the Office Action is not an accurate characterization of what Applicants previously argued to the extent that the quote excludes, and thereby ignores, the full distinction between the invention being claimed by Applicants and what is disclosed by Maenishi. What Applicants previously pointed out, and continue to point out, is that Maenishi does not disclose the steps of

1) counting the number of times in which the hydrogen generator (claim 21) and the fuel cell system (claim 29) are stopped and started-up and

2) increasing the temperature of the reformed in the shift converter, increasing the steam to carbon ratio, or both, based on an increase in a number of times in which the hydrogen generator or fuel cell system is stopped and started-up.

That fact that Applicants' independent claims require that the shift converter temperature and/or steam to carbon ratio are increased "based on an increase in a number of times in which the hydrogen generator or fuel cell system is stopped and started-up," has been completely ignored in the Office Action. Instead, there has been only a broad allegation at Page 2 of the Office Action that paragraph 4 of Maenishi "discloses correlating the temperature of the reformer to the number of starts and stops of the combustor, which is part of the hydrogen generator apparatus."

In the embodiment described at paragraph 0104 of Maenishi, the number of times in which the combustor is stopped and started, as well as the duration of time, are automatically preset according to the reforming catalyst at start-up. Based on the preset numbers, stopping and start-up of combustion is carried out. Maenishi does not disclose in paragraph 104, however, counting the number of times in which the hydrogen generator is started up and/or stopped and then increasing reformed gas temperature in the shift converter or steam to carbon ratio according to an increase in the times counted. In fact, the embodiment described at paragraph 0104 does not include a shift convertor, nor does it have anything to do with the steam to carbon ratio. Instead, that embodiment is concerned with correlating the temperature of the reformer catalyst with the temperature in the water evaporator of the unit in order to control the amount of liquid water in the reformer and thereby reduce start up time. This particular reformer unit described by Maenishi does not include a shift convertor, nor is it concerned with the steam to carbon ratio of the reformed gas that is produced.

As Applicants previously explained, operation of the Maenishi hydrogen generator is more particularly detailed in paragraph 0058. According to that operation procedure, the

reformer 3 is heated to a temperature at which the water evaporator 4 generates steam (i.e., start-up). The reformer 3 is heated such that the reforming catalyst reaches reaction temperature, while water is supplied to water evaporator 4 (i.e., preheat), and hydrogen is generated in the reforming reaction through contact of gaseous components with the reforming catalyst (i.e., hydrogen generation).

Fig. 5 of Maenishi shows that the combustor is repeatedly stopped and re-started at start-up of the hydrogen generator. Thus, it is only the combustor itself that is repetitively stopped and started-up, not the hydrogen generator. Therefore, Maenishi does not disclose counting the number of times in which the hydrogen generator is stopped and started-up.

Maenishi also indicates in paragraph 0104 that the number of times and the duration of times concerning stopping and start-up of combustion are set so that the water evaporator 4 is increased at an accelerating rate, while holding reforming catalyst temperature at less than 500°C. This means that temperature is changed based on the number of times in which the combustor is stopped and started-up. As indicated in paragraph 0058 and Fig. 5, the period in which the combustor is stopped and re-started is repeated only at start-up of the hydrogen generator. Hydrogen gas, however, can only be generated after start-up of the hydrogen generator.

Reformer temperature control in Maenishi is increased according to the number of times in which the combustor 12 is stopped and re-started. However, no reformed gas is generated during this period. Thus, Maenishi does not disclose increasing the reformed gas temperature in the shift converter. Accordingly, Maenishi fails to disclose a step of increasing reformed gas temperature in the shift converter according to an increase in the counted number of times of

start up or stopping. As a result, Maenishi fails to disclose or suggest the invention set forth in independent claims 21 and 29.

At Page 3 of the Office Action, it was alleged that Applicants previously argued that Taguchi "does not disclose increasing the reformed gas temperature based on the number of times of start and stop." Again, Applicant's point out that this argument is not an accurate characterization of what Applicants previously argued, and ignores the fact that Applicants' independent claims require that the shift converter temperature and/or steam to carbon ratio are increased "based on an increase in a number of times in which the hydrogen generator or fuel cell system is stopped and started-up." In particular, Taguchi's paragraph 0132, which has been specifically cited at Page 3 of the Office Action, discusses the effects of stopping and starting a CO converter on CO conversion, depending on the type of conversion catalyst used. This paragraph has nothing to do with control of shift converter temperature or steam to carbon ratio, much less controlling shift converter temperature and/or steam to carbon ratio relative to an increase in a number of times in which the hydrogen generator or fuel cell system is stopped and started-up, which is required by the independent claims. Accordingly, Taguchi fails to disclose or suggest the invention of claim 21 or 29.

Ukai discloses a hydrogen generator that is able to maintain a supply of reformed gas at low CO, while shift gas catalyst becomes deactivated. At paragraph 139, which was specifically discussed at Page 3 of the Office Action, it is disclosed that the composition of the reformed gas at outlet 8 is measured, and the stop/start cycle repeated 200 times. At paragraph 0018, which also continues to be cited in rejecting the noted claims, it is further disclosed that when the amount of reformed gas supplied to the shift reactor is increased, when the temperature of the

downstream portion of the shift catalyst is increased before any temperature increase of the reformed gas and when the amount of reformed gas sent to the shift reactor is decreased, the temperature of the downstream portion of the shift catalyst is lowered to a temperature lower than that prior to any decrease in the flow of the reformed gas. These cited paragraphs mean that Ukai discloses changing downstream temperature of the shift catalyst according to a change in reformed gas flow rate to the shift converter. There is no suggestion in Ukai that would suggest counting the number of times of start up and/or stop of said hydrogen generator or fuel cell system, and increasing reformed gas temperature in the shift converter and/or increasing a controlled steam to carbon ratio according to an increase in the counted number of times of start up and or stopping. Accordingly, Ukai fails to disclose or suggest the invention as described in either of claims 21 or 29.

Accordingly, it is submitted that all pending claims are directed to allowable subject matter, and a notice of allowance is respectfully requested.

Respectfully submitted,

/James Edward Ledbetter/

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JEL/RDJ/att

James E. Ledbetter
Registration No. 28,732

Attorney Docket No. 007002-06104
Dickinson Wright PLLC
1875 Eye Street, NW, Suite 1200
Washington, DC 20006
Telephone: (202) 457-0160
Facsimile: (202) 659-1559
DC 7002-6104 175702